REMARKS

Claims 1-19 are pending in the present application. By this response, claims 1, 7, 11, 17, and 19 are amended. Claims 1, 11, and 19 are amended in view of Examiner's comments. Claims 7 and 17 are amended to provide clarity. Reconsideration of the claims in view of the above amendments and the following remarks is respectfully requested.

I. 35 U.S.C. § 101

The Office Action rejects claims 11-18 under 35 U.S.C. § 101 as being directed towards non-statutory subject matter. Claim 11 is amended to recite a computer program product in a tangible computer readable medium for use in a data processing system, for partitioning a computer network end node.

The Office Action alleges that claims 11-18 are not limited to tangible embodiments. Although Applicants have amended claim 11 to recite "a tangible readable medium," there is no basis for holding a computer usable medium claim non-statutory because the medium may be allegedly "intangible." As stated in MPEP 2106 (IV)(B)(1):

> In this context, "functional descriptive material" consists of **data structures and computer programs which impart functionality when employed as a computer component.** (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.
>
> **When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized.** Compare *In re Lowry*, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and *Warmerdam*, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with *Warmerdam*, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure *per se* held nonstatutory). **(emphasis added)**

The present invention as recited in claims 11-18 is clearly functional descriptive material since it imparts functionality when employed as a computer component. Moreover, the functional descriptive material of claims 11-18 is recorded on "some" computer-readable medium.

In the above context, the term "some" means "any" computer-readable medium. The MPEP does not draw any distinctions between one type of media that is considered to be statutory and another type of media that is considered to be non-statutory. To the contrary, the MPEP clearly states that as long as the functional descriptive material is in "some" computer-readable medium, it should be considered statutory. The only exceptions to this are functional descriptive material that does not generate a useful, concrete and tangible result, e.g., functional descriptive material composed completely of pure mathematical concepts that provide no practical result. The present invention as recited in claims 11-18 clearly provides a useful, concrete and tangible result in that items similar to a target item, identified by a cursor's position, are identified and an indicator of these similar items is provided so that these similar items may be accessed. This is not just some disembodied mathematical concept or abstract idea.

Thus, the invention as recited in claims 11-18 is directed to functional descriptive material that provides a useful, concrete and tangible result, and which is embodied on "some" computer-readable medium. Therefore, the invention recited in claims 11-18 is statutory.

Moreover, even if claims 11-18 cover carrier waves and signal or transmission media, the Examiner is incorrect in the allegation that such waves and media are "intangible." The term "tangible" is not limited to elements that may be perceived only by the sense of touch. To the contrary, the term "tangible" refers to anything that is capable of being perceived, precisely identified or realized by the mind, or capable of being appraised at an actual or approximate value. In other words, something is "tangible" if it is possible to verify its existence. This does not require that the element be "touchable" but merely "perceivable."

Carrier waves and signal or transmission media are clearly perceivable, able to be precisely identified or realized by the mind, and are capable of being appraised. In other

words, carrier waves and signal or transmission media are measurable by appropriate devices for measuring such waves and media. Thus, they are "tangible" despite the allegations made by the Office Action. Since these types of media are "tangible," even if there were some requirement in the MPEP that the media be "tangible," then the present claims would still meet this requirement and thus, be directed to statutory subject matter. Thus, based on the MPEP and applicable case law, the Examiner has no basis for holding claims 11-18 to be non-statutory.

Therefore, Applicants respectfully submit that independent claim 11 is statutory. Since claims 12-18 depend from claim 11, they are statutory as well. Thus, Applicants respectfully request withdrawal of the rejection of claims 11-18 under 35 U.S.C. § 101.

II. 35 U.S.C. § 112, Second Paragraph, Claims 1-19

The Office Action rejects claims 1-19 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter, which applicants regard as the invention. Claims 1, 11, and 19 are amended for clarity by providing proper antecedent basis and to more clearly recite the subject matter which Applicants regard as the invention. Therefore, Applicants respectfully request withdrawal of the rejection of claims 1-19 under 35 U.S.C. § 112, second paragraph.

III. 35 U.S.C. § 103, Alleged Obviousness, Claims 1-19

The Office Action rejects claims 1-19 under 35 U.S.C. § 103(a) as being unpatentable over Pettey et al. (U.S. Patent No. 6,594,712 B1) in view of Yuasa et al. (U.S. Patent No. 6,085,238). This rejection is respectfully traversed.

As to claims 1, 11 and 19, the Office Action states:

> As to claim 1, Pettey teaches the invention substantially as claimed including a method for partitioning a computer network end node (col. 6, lines 14-29), the method comprising:
>
> - virtualizing a plurality of network devices on a single multi-function chip by means of a combination of hardware and software to from network devices (col.6, lines 20-47 and fig.1); and

- virtualizing at least one router on the multi-function chip by means of a combination of hardware and software to form a router (col.6, lines 22-27 and fig.1), wherein the virtual router performs control-flow processing for the virtual network devices (col. 6, lines 23-38 and figs. 7a-7b);

wherein the virtual network devices and the router form a subnet (col.6, lines 31-38).

Pettey does teach network devices, a router, a subnet, but does not explicitly teach a virtual network devices, a virtual router and a virtual subnet and the virtual router functions of destination lookup and packet forwarding are incurred only on control-flow processing.

Yuasa teaches a virtual network devices (see the abstract), a virtual router (col.72, lines 14-30, a virtual subnet (col.39, lines 3-14), and the virtual router functions of destination lookup and packet forwarding are incurred only on control-flow processing (col.39, lines 16-34 and col.72, lines 14-41).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Yuasa and Pettey because Yuasa's teaching would have provided the capability of enabling highs peed routing for the intranet. Thus, system costs are drastically decreased and intranet routing performance can be enhanced.

Office Action dated July 14, 2005, pages 4-5.

Claim 1, which is representative of the other rejected independent claims 11, and 19 with regard to similarly recited subject matter, reads as follows:

1. A method for partitioning a computer network end node, the method comprising:

virtualizing a plurality of network devices on a single multi-function chip by means of a combination of hardware and software to form virtual network devices; and

virtualizing at least one router on the single multi-function chip by means of a combination of hardware and software to form a virtual router, wherein the virtual router performs control-flow processing for the virtual network devices, and wherein the virtual router functions of destination lookup and packet forwarding are incurred only on control-flow processing;

wherein the virtual network devices and virtual router form a virtual subnet.

Pettey and Yuasa, taken alone or in combination, fail to teach or suggest virtualizing a plurality of network devices **on a single multi-function chip** by means of a combination of hardware and software to form virtual network devices, virtualizing at least one router **on the single multi-function chip** by means of a combination of hardware and software

to form a virtual router, wherein the virtual router performs control-flow processing for the virtual network devices and wherein the virtual router functions of destination lookup and packet forwarding are incurred only on control-flow processing, and wherein the virtual network devices and virtual router form a virtual subnet.

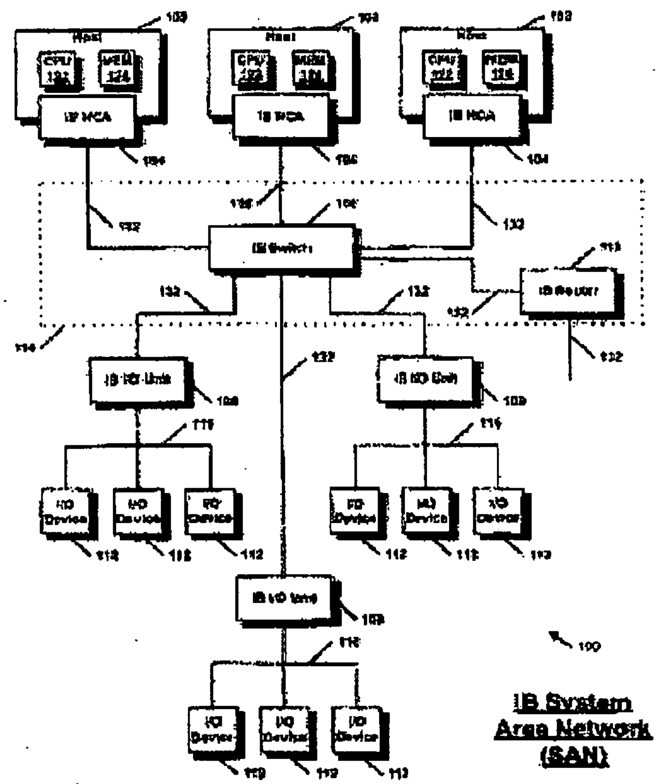
Pettey is directed to an Infiniband channel adapter for performing direct data transfers between a PCI bus and an Infiniband link without double-buffering the data in system memory. In the Pettey system, a local processor programs the channel adapter to decode addresses in a range of the PCI bus address space dedicated to direct transfers. When an I/O controller attached to the PCI bus transfers data from an I/O device to an address in the dedicated range, the channel adapter receives the data into an internal buffer and creates an Infiniband RDMA Write packet for transmission to virtual address within a remote Infiniband node. When the channel adapter receives an Infiniband RDMA Read Response packet, the channel adapter provides the packet payload data to the I/O controller at a PCI address in the dedicated range.

Thus, in the system of Pettey, the Infiniband channel adapter couples to an I/O controller via a local bus interface. The local bus interface receives data from the I/O controller if a local bus address of the data is within a predetermined address range of the local bus address space. The Office Action claims that Pettey teaches virtualizing a plurality of network devices on a single multi-function chip by means of a combination of hardware and software to form virtual network devices, at column 6, lines 20-47 and Figure 1, which read and are shown as follows:

> The hosts 102 are IB processor end nodes, such as server computers, that comprise at least a CPU 122 and memory 124 complex. Each of the hosts 102 includes one or more IB Host Channel Adapters (HCA) 104 for interfacing the hosts 102 to an IB fabric 114. The IB fabric 114 is comprised of one or more IB Switches 106 and IB Routers 118 connected by a plurality of IB serial links 132. For example, an HCA 104 may be coupled to a host 102 via a PCI bus or the HCA 104 may be coupled directly to the memory and/or processor bus of the host 102.
>
> The SAN 100 also includes a plurality of IB I/O units 108 coupled to the IB fabric 114. The IB hosts 102 and IB I/O units 108 are referred to collectively as IB end nodes. The IB end nodes are coupled by the IB switch 106 that connects the various IB links 132 in the IB fabric 114. The collection of end nodes shown comprises an IB subnet. The IB subnet may be coupled to other IB subnets (not shown) by the IB router 118 coupled to the IB switch 106.

Coupled to the I/O units 108 are a plurality of I/O devices 112, such as disk drives, network interface controllers, tape drives, CD-ROM drives, graphics devices, etc. The I/O units 108 may comprise various types of controllers, such as a RAID (Redundant Array of Inexpensive Disks) controller. The I/O devices 112 may be coupled to the I/O units 108 by any of various interfaces, including SCSI (Small Computer System Interface), Fibre-Channel, Ethernet, IEEE 1394, etc.

(Column 6, lines 20-47)



(Figure 1)

In this section and Figure, Pettey is describing how the hosts 102 include one or more IB Host Channel Adapters 104 for interfacing the hosts 102 to an IB fabric 114. The IB fabric 114 is comprised of one or more IB Switches 106 and IB Routers 118 connected by a plurality of IB serial links 132. Thus the numerous devices are interfaced to each other through the use of an Infiniband fabric 114. An Infiniband fabric is part of the InfiniBand Architecture (IBA), which is designed around the point-to-point switched I/O fabric whereby each node device is interconnected by cascade switch devices. This

architecture specifies an interconnection technology between processor nodes, and I/O nodes in order to form a System Area Network (SAN). IBA SAN consists of the processor nodes (HCAs) and I/O units (TCA) connected through the IBA fabric made up of the cascaded switches and the routers. Thus, the devices, in the system of Pettey, are separate **physical** devices that are **separately** interconnected through the Infiniband fabric and are not a plurality of network devices **virtualized on a single multi-function chip** by means of a combination of hardware and software to form virtual network devices.

Furthermore, Pettey does not teach or suggest virtualizing at least one router **on the single multi-function chip** by means of a combination of hardware and software to form a virtual router. The Office Action alleges that this feature is taught by Pettey at Figure 1 and column 6, lines 22-27, shown above. As discussed above, Pettey teaches an IB fabric that is comprised of Infiniband switches and Infiniband routers connected by a plurality of Infiniband serial links. The switches and routers are **physical** devices that are interconnected through the Infiniband fabric. Neither the switches nor the routers are **virtualized**. Thus, Pettey does not teach **virtualizing** at least one router on **the single multi-function** chip by means of a combination of hardware and software to form a virtual router.

Additionally, Pettey does not teach or suggest the virtual network devices and virtual router form a virtual subnet. The Office Action alleges that this feature is taught by Pettey at column 6, lines 31-38, shown above. In the cited section, Pettey is merely describing that the physical devices, IB hosts and IB I/O units, connected through the Infiniband fabric are referred to collectively as IB end nodes. The coupling of the IB end nodes by the IB switch comprises an IB subnet. While Pettey may teach a subnet comprised of hosts and switches, the subnet is a physical subnet and not a virtual subnet. Furthermore, the switches and hosts that comprise the subnet of Pettey are physical devices and not virtual network devices and a virtual router.

Furthermore, Pettey does not teach or suggest the virtual router functions of destination lookup and packet forwarding are incurred only on control-flow processing. The Office Action admits that Pettey does not teach this feature on page 4, but alleges that Yuasa teaches this feature. Yuasa does not provide for the deficiencies of Pettey

and, thus, any alleged combination of Yuasa and Pettey would not be sufficient to reject claims 1, 11, and 19. That is Yuasa does not teach virtualizing a plurality of network devices **on a single multi-function chip** by means of a combination of hardware and software to form virtual network devices, virtualizing at least one router **on the single multi-function chip** by means of a combination of hardware and software to form a virtual router, wherein the virtual router performs control-flow processing for the virtual network devices and wherein the virtual router functions of destination lookup and packet forwarding are incurred only on control-flow processing, and wherein the virtual network devices and virtual router form a virtual subnet. The Office Action states:

> Yuasa teaches a virtual network devices (see the abstract), a virtual router (col.72, lines 14-30, a virtual subnet (col.39, lines 3-14), and the virtual router functions of destination lookup and packet forwarding are incurred only on control-flow processing (col.39, lines 16-34 and col.72, lines 14-41)

The cited sections read as follows:

> A virtual LAN system forms a virtual group which is based on elements having physical attribute or logical attribute and constituting a virtual LAN, sets a client address and priority of the virtual group in a virtual group registration table, and allocates unicast and broadcast traffic bands in group units.

(Abstract)

> When the intranet routing/bridge protocol processing section 470 of the intranet router 459 prepares a routing table containing learning filtering 471A, 471B of layer 402 and 403 addresses, the table is cached in the virtual group routing table (cut-through table) 485 of the virtual group distributed management sections 488, input packet is cut through, and the intranet routing/bridge protocol processing section 470 is bypassed. The intranet routing/bridge protocol processing section 470 converts into a LAN packet by LAN emulation from ATM in conformity with the ATM forum standard and performs virtual router processing by MPOA of upper layer. In addition to the filtering 471A, 471B, the intranet routing/bridge protocol processing section 470 contains LAN emulation 474, IP connection (RFC1577) MPOA 475, and route calculation 476 so as to be able to handle standard protocols such as 1-PNN1 and IP connection (RFC1577).
>
> VLAN as a local intranet segment and a global internet segment are separated, routing of VLAN as an intranet segment is processed in the intranet routing table of the distributed network service equipment 411 close to a desktop, packets are filtered so that only internet segment traffic

is sent to the ports to which the main router is connected, and the main router of the WAN connection unit 455 of the integrated network service equipment 451 processes routing connected to the internet or LAN in the internet routing table.

(Column 72, lines 14-41)

As described above, a virtual subnet configuration wherein management of the virtual group registration/routing table (intranet routing table) does not concentrate on the main router 201 can also be realized in multilayer switching with layer 202 (data link layer) and layer 203 (network layer); multicast is efficiently processed for shortening the delay time and multiports are supported. Virtual groups (VLANs) independent of internet protocol subnets can be formed and VLAN routing can be processed by the local router switch 202 and the local switches 203a . . . separately from internet routing.

(Column 39, lines 3-14)

In a tenth embodiment of the invention, virtual group IDs and subnet IDs can be set in virtual group registration/routing tables in virtual group registration/routing table sections 214a . . . of local switches 203a . . . in the same configuration as the ninth embodiment. (See FIG. 20.) Only when the destination virtual group ID of a transmission packet does not match any virtual group ID of local site VLANs registered in the virtual group registration/routing table, an intranet processing section 209 of a local router switch 202 encapsulates the destination virtual group ID in an internet protocol packet with the destination subnet ID and forwards and the resultant packet to a main router 201. If the destination client address differs from the virtual group ID of the source client address and the destination subnet ID matches the local site subnet ID, the local router switch 202 unicasts or multicasts the packet to the port corresponding to the destination client address.

(Column 39, lines 16-34)

While in these sections, Yuasa may describe the implementation of virtual network devices, the virtual network devices are not virtualized **on a single multi-function chip** by means of a combination of hardware and software to form virtual network devices. The virtual router is not at least one router virtualized **on the same single multi-function chip** by means of a combination of hardware and software to form a virtual router Additionally, in contradiction to the Office Action's allegation that Yuasa teaches control-flow processing, nowhere in Yuasa is control-flow processing even mentioned.

Thus, Yuasa fails to teach or suggest a **virtual router** that has functions of destination lookup and packet forwarding, which are incurred only on **control-flow processing**.

Furthermore, there is not so much as a suggestion in either reference to modify the references to include such features. That is, there is no teaching or suggestion in Pettey or Yuasa that a problem exists for which virtualizing a plurality of network devices on a single multi-function chip by means of a combination of hardware and software to form virtual network devices, virtualizing at least one router on the single multi-function chip by means of a combination of hardware and software to form a virtual router, wherein the virtual router performs control-flow processing for the virtual network devices and wherein the virtual router functions of destination lookup and packet forwarding are incurred only on control-flow processing, and wherein the virtual network devices and virtual router form a virtual subnet, is a solution. To the contrary, Pettey only teaches the connection of physical devices through an Infiniband fabric. Yuasa merely teaches virtual network devices. Neither reference even recognizes a need to virtualize a plurality of network devices and router **on a single multi-function chip** by means of a combination of hardware and software to form virtual network devices and a virtual router, where the virtual router performs control-flow processing for the virtual network devices and where the virtual router functions of destination lookup and packet forwarding are incurred only on control-flow processing, and wherein the virtual network devices and virtual router form a virtual subnet, as recited in claim 1.

Moreover, neither reference teaches or suggests the desirability of incorporating the subject matter of the other reference. That is, there is no motivation offered in either reference for the alleged combination. The Office Action alleges that the motivation for the combination is "Yuasa's teachings would have provided capability for enabling highs peed (sic) routing for the intranet." Neither reference teaches virtual network devices or virtual routers on a single multifunction chip, or control-flow processing. Thus, the only motivation to even attempt the alleged combination would be based on a prior knowledge of Applicants' claimed invention, thereby constituting impermissible hindsight reconstruction using Applicants' own disclosure as a guide.

One of ordinary skill in the art, being presented only with Pettey and Yuasa, and without having a prior knowledge of Applicants' claimed invention, would not have

found it obvious to combine and modify Pettey and Yuasa to arrive at Applicants' claimed invention. To the contrary, even if one of ordinary skill in the art were somehow motivated to combine Pettey and Yuasa, and it were somehow possible to combine the two systems, the result would not be the invention, recited in claim 1. The result would be a network of physical devices and routers connected through an Infiniband fabric that receives IP packets using a mapping table. The resulting system still would not virtualize a plurality of network devices **on a single multi-function chip** by means of a combination of hardware and software to form virtual network devices and virtualize at least one router on the single multi-function chip by means of a combination of hardware and software to form a virtual router, wherein the virtual router performs control-flow processing for the virtual network devices and wherein the virtual router functions of destination lookup and packet forwarding are incurred only on control-flow processing, and wherein the virtual network devices and virtual router form a virtual subnet.

Thus, Pettey and Yuasa, taken alone or in combination, fail to teach or suggest all of the features in independent claims 1, 11, and 19. At least by virtue of their dependency on claims 1, 11, and 19, the specific features of claims 2-10 and 12-18 are not taught or suggested by Pettey and Yuasa, either alone or in combination. Accordingly, Applicants respectively request withdrawal of the rejection of claims 1-19 under 35 U.S.C. § 103(a).

IV. Conclusion

It is respectfully urged that the subject application is patentable over the prior art of record and is now in condition for allowance. The Examiner is invited to call the undersigned at the below-listed telephone number if in the opinion of the Examiner such a telephone conference would expedite or aid the prosecution and examination of this application.

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Respectfully submitted,

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